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XXIII. "On the Thermal Effects of Fluids in Motion."—Part IV. By J. P. Joule, LL.D., F.R.S., and Professor W. Thomson, F.R.S. Received June 19, 1862.

(Abstract).

A brief notice of some of the experiments contained in this paper has already appeared in the 'Proceedings.' Their object was to ascertain with accuracy the lowering of temperature, in atmospheric air and other gases, which takes place on passing them through a porous plug from a state of high to one of low pressure. Various pressures were employed, with the result (indicated by the authors in their Part II.) that the thermal effect is approximately proportional to the difference of pressure on the two sides of the plug. The experiments were also tried at various temperatures, ranging from 5° to 98° Cent., and have shown that the thermal effect, if one of cooling, is approximately proportional to the inverse square of the absolute temperature. Thus, for example, the refrigeration at the freezing temperature is about twice that at 100° Cent. In the case of hydrogen, the reverse phenomenon of a rise of temperature on passing through the plug was observed, the rise being doubled in quantity when the temperature of the gas was raised to 100°. This result is conformable with the experiments of Regnault, who found that hydrogen, unlike other gases, has its elasticity increased more rapidly than in the inverse ratio of the volume. The authors have also made numerous experiments with mixtures of gases, the remarkable result being that the thermal effect (cooling) of the compound gas is less than it would be if the gases after mixture retained in integrity the physical characters they possessed while in a pure state.

XXIV. "On the Spectra of Electric Light, as modified by the Nature of the Electrodes and the Media of Discharge." By the Rev. T. R. Robinson, D.D., F.R.S. Received June 19, 1862.

(Abstract.)

The author, after referring briefly to the researches of previous inquirers, and the hypothesis now generally adopted, that the bright lines observed in these spectra depend so absolutely on the chemical nature of the substances present that their occurrence is an unerring test of that presence, expresses his belief that it cannot be admitted